Control System Evolution –

A White Paper on evolving your ABB Open Control System to 800xA Extended Automation

Evolution - ABB's Strategy for the Future

Each of our customers first acquired their automation system from ABB because it offered the best set of solutions to help their business be successful and competitive. Whether it was ease of configuration, system scalability, powerful control applications or human interface, the system met their needs in an effective and efficient manner.

But our customers' markets and business conditions are constantly changing. Many of you now require faster turnarounds, greater customization, smaller lot sizes, and of course lower overall cost. In today's fast paced, global economy our customers are likely to be under more pressure than ever before to run their operation profitably - to achieve greater results with fewer resources.

ABB recognizes that production gains through process control improvements are no longer enough to guarantee success. To remain competitive, our end-user customers need to change and improve their business processes. Today, their most common challenge is how to squeeze the most productivity from their existing system, adding new functions and features, extending the useful life of the system and applications within it, and reducing maintenance costs, while improving overall reliability. The key challenge is to maximize Return On Assets (ROA) where assets include not just the physical plant, but the people, processes, intellectual property, and customers.

"Today, our end user's most common challenge is, how to squeeze the most productivity from their existing system while improving overall reliability."

ABB addresses these needs. We spend millions of dollars annually in research and development to provide new functions and features and improve the cost/performance curve of our products. We make our products more reliable, and incorporate proven, new technology to enable step change benefits. A customer deploying a new automation system can readily take advantage of these latest capabilities. But customers with existing system installations have additional concerns:

Maintain Productivity - Systems must remain operational and productive, often in perpetual mode - 24 hours a day, seven days a week. Typically there are very brief periods (or none at all) to install new hardware or software. When upgrades can occur, there must be no risk that jeopardizes the operation of the plant or mill.

Protect Investment - Most ABB control system users have made a significant investment in control application software, user graphics, personnel training, SOPs, verification and checkout, formal validation for the regulated industries, and historical production information collected by and stored in the system. The upgrade process must not compromise these investments.

Budgets - For the average user, improvements must be made with an ongoing maintenance budget rather than large capital project funding. Changes to the system must be limited to the specific area of interest, and there must be a solid Return On Investment. ABB's solution is a well-conceived evolution strategy. Evolution is ABB's way to provide ongoing value to our installed systems that lets our customers meet their business objectives for their automation systems in an incremental way, affording the lowest risk and lowest cost.

Our customers made major investments when they purchased their automation system. Throughout ABB's history, we have enabled our customers to extend the useful life of their control system investment and, perhaps most importantly, protect their investments in hardware, software, and intellectual property. We work closely with our customers to use their investments as a foundation to continuously extend the functionality of their system as new capabilities become available. We introduce new technology in a way that allows stepwise incorporation into previous versions, helping customers get the best performance out of their automation investment.

It has always been ABB's philosophy to provide a deliberate evolution path for all of our systems. Taking care of our installed base is a top priority. A true evolution strategy provides a path forward for expanded functionality that builds upon and enhances the foundation of system products and customer applications already in place. It often requires significant rework, for example, redevelopment of existing applications, and complete replacement of technology - and that is just to replace the functionality that was installed. With migration, this hurdle must be cleared before actual productivity improvements may be implemented.

Evolution is not a rip and replace exercise. It is a well thought out plan that lets our customers adapt new capabilities at their pace, according to their need - adding capability, not replacing. With our incremental evolution approach, we allow our customers to match their investment to their specific productivity improvement needs while minimizing risk, both in terms of dollars and productivity. This is how we've maintained our installed base.

A Four-pronged Evolution Strategy

Superior products are the cornerstones of ABB's evolution strategy; however, we understand that simply incorporating new products into an existing system will not ensure success or provide the desired results. Our products represent the first prong in a comprehensive, four pronged solution that includes:
- Products
- Evolution Planning
- After Sales Programs
- Engineering and Project Delivery

Products

At ABB, the concept of evolution is fundamental to our product planning and development. It is not an after thought. Each new step is part of a natural progression in the current system offering.

New releases never behave like a plug-in or raw adaptation of someone else's product. ABB has rigid guidelines to ensure the compatibility of differing versions and models of system components. For example, new controllers can coexist on the same control network as previous generations and operate together seamlessly. The customer's application code runs as it did when first developed. New features and capabilities must be able to be adapted seamlessly, with minimum impact to the existing application. It is never "throw it away and start from scratch."

In order to fulfill an individually tailored upgrade path, ABB products provide a unique offering of flexibility and scalability. The ability to mix and match hardware and software of different generations is one of our strengths.

ABB has products that preserve the investments customers have made in field connections, I/O, controller hardware, and so on so that they can use the base control hardware infrastructure, as well as protect the intellectual investment they have made in their software applications. This can all be implemented in a stepwise, low cost, low risk manner.

One of the key value propositions of ABB's *Evolution through Enhancement* pledge is protecting the customers' investment in intellectual property. This includes operator graphics, historical data, batch recipes, control programs, operator training, and so on. ABB makes tremendous investments to develop and provide services and products to protect these investments.
For example:
• Graphical conversions save the time and expense of re-engineering and intensive user retraining
• Database conversion scripts are integrated into the historical database restore utility so existing historical data, and historical data collection applications can be transferred directly to the new history platform
• Cable kits that eliminate the need for rewiring and reduce the time and costs for re-checkout when existing I/O is replaced with a new I/O product

After Sales Programs
ABB promotes a proactive approach to hardware and software upgrades. We work with our customers to do stepwise, incremental upgrades to help them stay current and avoid hitting the brick wall of obsolescence. This philosophy lets our customers continuously improve productivity through stepwise extensions of their automation system. It also enables them to take advantage of new technologies and automation product offerings as they become available.

ABB has devised a comprehensive set of sales programs that provide a cost-effective means to evolve to the latest ABB products, and to keep systems current with the latest software.

Evolution programs are designed to give customers the financial flexibility to "step-up" from their existing automation systems to new, higher performance Human System Interfaces, system engineering tools, controllers, control networks, and information management - one functional area at a time.

Software management programs help end users to properly manage their software assets. These programs provide immediate access to the latest productivity enabling software. Automatic delivery of new software lets ABB customers benefit from:
• Better productivity through enhanced software functionality
• Lower support costs and simpler software management with one annual fee
• Staying current with the latest Industry/IT standards
• Access to the most current documentation

These programs position the existing automation system for new technology as it becomes available, and continuously evolve the system to higher levels of control, information management, and connectivity.

Planning

Of course, a successful evolution program must begin with a solid plan driven by the customer's business goals. Good planning helps to minimize the negative production impact from any upgrade, and is critical for any incremental, stepwise evolution. It simplifies and improves yearly budgeting, and facilitates planning for system upgrades and plant shutdowns.

Individual planning with our customers is essential. At ABB, we don't have a "one size fits all" approach. Different customers in different industries invariably have their own unique strategies and business issues going forward. Account managers and technical experts work with them individually to address all of their needs. A collaborative relationship between ABB and our customers lets us map out the best strategies for their operations.

After a comprehensive audit of the customer's existing system and an understanding of his business drivers, ABB will submit a 3-5 year plan to be reviewed and revised as necessary. Our incremental approach supports flexibility, and allows for changes to the plan as may be required over the course of time.

Together, the customer and ABB identify and target which facilities are at greatest risk and should be considered in the near-term planning process. As each phase is identified, ABB provides value and Return-on-Investment ideas for consideration in order to facilitate successful project appropriations requests.

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The long-term plan is reviewed periodically and updated as required to reflect the customer's changing business needs and new ABB solutions. As part of this planning, specific projects are identified and initiated.

Engineering and Project Delivery

Engineering and delivery of solutions to our customers are two important elements in the evolution value chain. ABB's operation engineers are highly trained and skilled, and they are equipped with the tools and resources to do the job correctly. These engineers know what our customers have, what they want for the future, and how to deliver it.

The project begins with a comprehensive review of the requirements formulated in the long-term plan. ABB engineers work closely with the customer to formulate a project plan to achieve the desired end results. Based on this collaborative effort, the engineers design a solution that will deliver results, protect the customer's investments and present the lowest risk possible during installation.

ABB's Commitment to Your Future

Our overall goal is to mitigate your ongoing risk, while helping you to get the most use out of your system investment possible. We work with you on a continuous basis to help you choose the path and pace forward that are right for you.

"ABB's four-pronged approach with superior products, skilled engineering, flexible programs, and solid planning, helps our customers use what they have to get what they need."

Our customers made major investments when they purchased their automation system. Regardless of whether that investment was 1, 5, 10, or 15 years ago, that automation system is still a vital and sustainable part of their manufacturing strategy. It can be enhanced and extended for years to come in a way that presents the lowest lifecycle costs and lowest risk. ABB's four-pronged approach with superior products, skilled engineering, flexible programs, and solid planning, helps our customers use what they have to get what they need.

For our customers, incremental additions are certainly the most cost-effective solution, as we work closely with them to upgrade at their own pace. ABB's four-pronged approach with superior products, skilled engineering, flexible programs, and solid planning, helps our customers use what they have to get what they need.

Evolving to System 800xA

Our pledge of *Evolution through Enhancement* ensures that future advances in systems technologies will enhance rather than compromise our customers' current investments. The cornerstone of ABB's continuing evolution strategy is our recently released Industrial IT Extended Automation System 800xA. This is the latest installment in ABB's 20+ years of commitment to our customers. There are four key reasons that our customers are motivated to upgrade:

- To squeeze more productivity out of their current system by adding functionality
- To extend the useful life of the system and the applications within it
- To reduce overall maintenance (lifecycle) costs
- To improve reliability

System 800xA was designed and continues to evolve with these reasons in mind.

System 800xA

Applications in System 800xA are designed to be integral extensions of our existing control systems, allowing our customers to add applications and functionality that address their specific needs. We enable our customers to use their solid process control foundation to improve their overall automation implementation. This is achieved by adding specific new functionality that will enable them to get the benefits they need right away. When they add any part of System 800xA software to their system, they incorporate the foundation necessary to integrate other features and solutions in an efficient and low risk manner, as their needs evolve.

Industrial IT was developed in response to the information explosion dilemma all companies face. The information is there - captured somewhere. The challenge is to find the information, extract it from disparate systems, and be able to sort and deliver it efficiently and effectively to support decisions that make your business more profitable.

Theoretically, more data leads to better, informed decisions and higher productivity. Each user is forced evaluate and understand the same large, indiscriminate pool of data. In reality, when data is presented without user context, production losses are likely to occur. System 800xA delivers the exact information - filtering out the noise - to facilitate consistent, sound business decisions, and to provide the environment for a quick and effective response.

System 800xA extends the reach of traditional automation systems beyond control of the process, to achieve the productivity gains necessary to succeed in today's business markets. For the first time, this scope is accessible from a single user interface that is configured to present information and provide interaction in a context appropriate to all user disciplines. Extended Automation objects created within the 800xA engineering environment provide a foundation for the efficient development, deployment, reuse, and continuous improvement of production applications with a predictability that is unattainable from other automation solutions.

Aspect Object™ Technology

Real-time decisions that prevent or limit production upsets require a consistent infrastructure for data, operations, engineering, maintenance, and management across the entire enterprise. The framework for the 800xA system architecture is built upon ABB's patented Aspect Object™ technology.

Real World Object	Process Display	Aspect Views

Alarm List

Faceplate

Trend Display

Operator Note
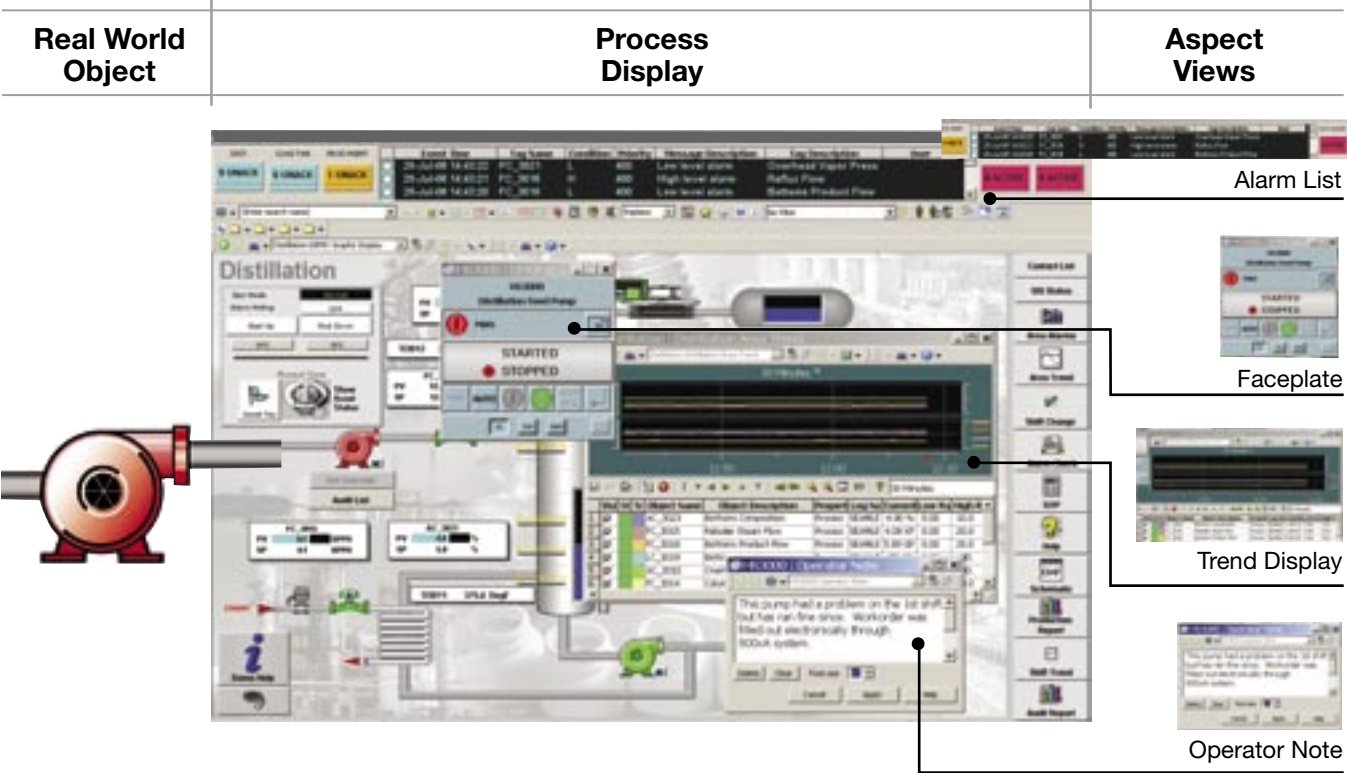
Aspect Objects relate plant data (the aspects) to specific plant assets (the objects). Aspects are informational items which are assigned to each object in the system, such as I/O definitions, engineering drawings, process graphics, reports, trends, and so on.

The unique operating environment of System 800xA lets you incorporate "best in class" products, applications and services from ABB, the world's largest supplier. ABB's automation portfolio provides the seamless link between process and business management to deliver knowledge-based solutions. Removing the barriers of traditional distributed control systems, the 800xA system supports the platform, application, and professional service needs of total plant management and control.

Integrated Core Functions

System 800xA dramatically improves plant-wide productivity with powerful, integrated core functions.
You can integrate these functions into an existing ABB system without compromising your intellectual and hardware investments.

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Operations: Process Portal, the most intuitive system interface in the industry, provides a consistent method for accessing enterprise-wide data and for interacting with multiple applications from any connected workstation in the plant or office.

800xA Process Portal harnesses the power of the 800xA Aspect Object technology to provide a consistent and intuitive view for data, operations, engineering, maintenance, and management across the entire enterprise. Your current graphic displays and operator's environment can be seamlessly transferred to the new platform. There is no need to redesign or re-configure your existing application. The Human System Interface works with total transparency with the existing control platform. This means new and better functionality with less retraining, preservation of standard operation procedures, and lower costs.

Engineering: An integrated engineering environment efficiently supports the complete life cycle of the automation project, minimizing system ownership costs from planning, through configuration and library management, to commissioning and operation.

Information Management: Powerful information management software collects, stores, retrieves, and presents historical, process, and business data to enhance the usefulness of data from all operations. Your existing history data (including archives) and configuration can be moved seamlessly into the new platform.

Batch Management: Production management and optimization tools provide the agility, speed, and control needed to respond to increasing production demands by modeling, executing, and tracking information associated with material and control flow across the plant.

Asset Optimization: Asset optimization software exploits the wealth of plant resident information to assess and report equipment conditions in real-time. This reduces costly corrective and preventive maintenance and optimizes maintenance and calibration work flows.

Control and I/O: A comprehensive suite of standards-based hardware and software meets the needs of total plant control. Controllers are complemented with a full line of industrial I/O interfaces to meet the requirements of all plant environments.

The new controllers are faster, have more memory, and are more secure (1:1 redundancy). They can co-exist with the existing controllers, or your existing control configurations can be moved - unchanged - to the new controllers. The new I/O fits in a smaller footprint, utilizes simple DIN rail mounting, has a redundant communications, which may be implemented on an optional basis. Conversion kits let you leave your existing termination panels and field wiring in place.

Fieldbus (Field Device Integration): System 800xA's integration of all fieldbus standards lowers life cycle costs through significant cost savings in the design, implementation, and operation of field equipment.

Integration and Connectivity

The open architecture of System 800xA reduces life cycle costs by simplifying the task of integrating plant systems and devices. The useful life of the system is extended as the open architecture supports easy integration of new commercially-off-the-shelf (COTS) applications and products.

System 800xA seamlessly integrates traditionally isolated plant devices and systems via OPC®, Ethernet, TCP/IP, PROFIBUS DP, FOUNDATION Fieldbus™ (H1 and HSE), and HART®. This extends the reach of the automation system to all plant areas. The result is a simplified software representation of the plant, from simple on/off-type switches and valves to smart field devices, dedicated control subsystems, variable-speed drives, intelligent switchgear, and popular PC-based supervisory systems.

The resident information is used by System 800xA control strategies and higher level applications to produce tighter, more reliable process control solutions.

"System 800xA seamlessly integrates traditionally isolated plant devices and systems, extending the reach of the automation system to all plant areas. The result is a simplified software representation of the plant."

Summary

ABB control system customers made significant system investments in the hardware and software that together comprise their initial installation. Over time, most of these customers have continued to enhance their initial installation, building a cache of intellectual and physical resources such as the training and experience of operators, archives of historical data, proprietary applications, and detailed graphics. ABB is also continuously investing in this valuable installed base through research and development, personnel and training, etc.

ABB's strategy of *Evolution through Enhancement* assures our customers that their investments are protected. This strategy lets our customers adopt the latest control system technology – at their pace and according to their business needs – adding new capabilities, not replacing existing functions. Our incremental approach allows customers to minimize both their cost and their productivity risks.

Contact ABB now to discuss your strategy for evolution to System 800xA.